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BEFORE THE
POSTAL REGULATORY COMMISSION
WASHINGTON, D.C. 20268–0001

PERIODIC REPORTING (PROPOSAL SIX)	Docket No. RM2020-13

RESPONSES OF THE UNITED STATES POSTAL SERVICE
TO QUESTIONS 1-8 OF CHAIRMAN'S INFORMATION REQUEST NO. 2
(November 5, 2020)

The United States Postal Service hereby provides its responses to the above listed questions of Chairman's Information Request No. 2, issued October 26, 2020. The questions are stated verbatim and followed by the response.

Respectfully submitted,

UNITED STATES POSTAL SERVICE

By its attorney:

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1. Figures 1 through 12 of the Variability Report contain references to the worksheets in the Library Reference USPS-RM2020-13/1 that were used to perform the underlying calculations. Variability Report at 10-26. Considering that the referenced spreadsheets contain the hard-coded data, please provide references or links to the primary data sources, such as worksheets filed in the library references within the Annual Compliance Review or other dockets.

RESPONSE:

For Figures 1 and 2, the Excel workbook "FY07-19 MP Costs w-RPW_v.xlsx" in USPS-RM2020-13-1 provides detailed citations to Annual Compliance Review sources on the "Cost Pool Detail," "wage," "factors," and "Summary Volume & Weight" worksheets. In addition, a linked version of this workbook is provided in new folder USPS-RM2020-13-3.

As was noted in the USPS-RM2020-13-1 (Preface at 3-4), the source data for Figures 3-10 are computed in the Stata program "analysis.do" in USPS-RM2020-13-1, and are reported in the workbook summary_by_aggopgroups.xlsx. A version of the summary_by_aggropgroups.xlsx workbook indicating the data used in each figure is provided in new folder USPS-RM2020-13-3. Note that the summary data are based on unscreened monthly totals of the MODS variables by operation group from the analysis_set.dta dataset, and may be computed in alternative software from the provided analysis_set.xlsx workbook. As is shown in the analysis.do code, productivity and throughput statistics are computed simply as ratios of the monthly total TPF to workhours and runtime (respectively).

The rolling-sample regression results shown in Figures 11 and 12 are generated in the Stata program "analysis_seasonal.do" in USPS-RM2020-1. The coefficient estimates from the regressions are reported in the workbook rolling_results_seasonal.xlsx. The

relevant coefficient estimates for the elasticities are copied to the "Results" worksheet of the file Figs 11-12 rolling_results.xlsx. The source columns are indicated in the file Figs 11-12 rolling_results.xlsx, in new folder USPS-RM2020-13-3. The data from "Results" are reorganized with the pivot table on the "Pivot" worksheet. The data on the "hrs_var" and "runtime_var" are copies (pasted as values) of the "Pivot" table with, respectively, "hrs" and "runtime" selected as the filter value in worksheet "Pivot" cell B2 (indicating yvar, i.e., the regression dependent variable).

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2. The Variability Report states that "[f]or the extended models with lags [presented in equations (4) and (5)],…the [total pieces fed (TPF) elasticit[ies] (variabilities) are calculated as] the sum of the [current and two lagged TPF] coefficients b_1, b_2, and b_3," respectively. Variability Report at 21. Please explain why the elasticities were calculated as described above. With your response, please include the detailed underlying mathematical calculations and provide references to the relevant academic or research literature that discuss the estimation of elasticity in the presence of lagged variables.

RESPONSE:

The elasticity is calculated under the assumption that current and lagged output are scaled by a common factor, λ. The factor represents a shift of the path of both current and lagged output, as would occur given a sustained change in volume and hence TPF workload. Using equation 5 from the Variability Report, consider:

$$\ln Workhours_{it} = a_i + b_1 \ln(\lambda \cdot TPF_{it}) + b_2 \ln(\lambda \cdot TPF_{i,t-1}) + b_3 \ln(\lambda \cdot TPF_{i,t-12}) + c \cdot D_{m(t)} + e_{it}$$

It follows that:

$$\partial \ln Workhours_{it} / \partial \ln \lambda = b_1 + b_2 + b_3$$

This is the sum of the elasticities with respect to current and lagged TPF. This approach follows the development of what is termed the "elasticity of size" in Robert G. Chambers, *Applied Production Analysis: A Dual Approach* (Cambridge University Press, 1988) at 68-72—i.e., the response of resource usage or cost with respect to variations in output.

In distributed lag models such as equation (5) from the Variability Report, the coefficient on current-period TPF would be interpreted as a short-run (or contemporaneous) elasticity of TPF on workhours, whereas the sum of the coefficients on the contemporaneous and lagged TPF would represent the longer-run elasticity. See, e.g., Badi H. Baltagi, *Econometrics* (Springer-Verlag, 2008) at 129.

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3. Please refer to the Response to CHIR No. 1 where the Postal Service states: "explicit network variables such as delivery points served by plants exhibit high degrees of multicollinearity with facility fixed effects[.]"[1] Please also refer to the cited above testimony, which stated: "[t]he result that the inclusion of the site dummy variables dramatically inflates the standard errors of the deliveries elasticities is classically symptomatic of near-multicollinearity between possible deliveries and the fixed effects…. Whether the model specifications can be modified to quantify the effects of the network on mail processing labor cost with low standard errors is a matter for future research." USPS-T-14 at 70. Please discuss whether in the analysis underlying Proposal Six, the Postal Service investigated how model specifications and greater data availability would alleviate the multicollinearity issues identified in Docket No. R2001-1. If applicable, please provide the results of such investigations (including, but not limited to, program, log, and output files).

RESPONSE:

The Postal Service determined that there was no change in the network-related data available to quantify such effects. These circumstances informed the response to question 2(c) of Chairman's Information Request No. 1 (October 14, 2020) that "the Postal Service did not believe that the significant effort required to construct such variables was justified." There are no additional responsive results to report.

[1] Response to CHIR No. 1, question 2.c. (citing Docket No. R2001-1, Direct Testimony of A. Thomas Bozzo on Behalf of the United States Postal Service, September 24, 2001, at 69-70 (USPS-T-14)).

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4. Please refer to regression equations (4) and (5) on page 21 of the Variability Report. Considering that the referenced extended regression models contain the current and two lagged TPF variables, please discuss whether the Postal Service performed any analysis of multicollinearity issues that might be caused by the inclusion of lagged explanatory variables into the referenced regression models. If applicable, please provide the results of such analysis (including, but not limited to, program, log, and output files).

RESPONSE:

The Postal Service's analysis indicated that the first lag of TPF is highly collinear with current TPF, and that the twelfth lag of TPF also is highly correlated with current-period TPF for all of the operation groups analyzed for Proposal Six. See file analysis_seasonal_chir2vif.txt in new folder USPS-FY2020-13-3 for results of analysis showing correlations and variance inflation factors for the regressors of the model in equation (5) of the Variability Report.

Nevertheless, multicollinearity among the current and lagged TPF variables does not appear to be a major problem for the analysis. First, the presence (or absence) of multicollinearity does not affect the statistical bias or consistency of the estimated coefficients, but would tend to increase the standard errors of the affected coefficient estimates.

Second, the multicollinearity does not appear to have had major adverse effects on the estimated standard errors of the elasticities. A typical adverse effect of multicollinearity would be a finding that coefficients on certain variables were statistically insignificant despite theoretical reasons to expect otherwise. In the Proposal Six analysis, the coefficients on the lagged TPF variables are, for the most part, statistically significant (individually and/or collectively), and it is not unexpected that the elasticities with

respect to lagged TPF are small relative to the elasticity with respect to current TPF. The effects of multicollinearity on the standard errors also are mitigated by the relatively large number of observations and by the use of sum of the current and lagged TPF coefficients as the variability in Proposal Six. The variance of the sum of the TPF coefficients benefits from negative correlations for certain pairs of the coefficient estimates, shown in the file analysis_seasonal_chir2vif.txt.

Third, the main results are robust to common mitigation strategies for multicollinearity. For example, dropping one (or both) lags may help mitigate the issue, as current TPF and/or the remaining lagged TPF variable would be expected to capture most of the effects of the omitted lagged TPF variable(s) on workhours. As shown in the response to Chairman's Information Request No. 1, Question 2(b) (October 14, 2020), while the estimated standard errors for the elasticities from the equation (5) specification including both lags are generally higher than the alternative specifications including no lags or only one of the lags, as would be expected, the estimated standard errors are within one percentage point (0.01) of the equation (5) results and the elasticity point estimates are similar.

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5. Please refer to Docket No. ACR2019, Library Reference USPS-FY19-23, December 29, 2017, Excel file "YRscrub2019.xlsx," tab "Table," cells C13:C18, C25:C48.

a. Please describe the differences between all of the various types of Automated Flats Sorting Machine (AFSM) 100 operations (e.g., AFSM 100 Out Primary, AFSM 100 Out Secondary) and delivery bar code sorter (DBCS) operations (e.g., Out BCS Primary, Out BCS Secondary).

b. Please confirm that when aggregating the TPF data for the purposes of econometric analysis in Proposal Six, the Postal Service did not differentiate between various types of AFSM 100 operations and/or DBCS operations discussed in question 5.a.

c. If question 5.b. is confirmed, please explain why the differences between various types of AFSM 100 and/or DBCS operations were not considered.

d. If question 5.b. is not confirmed, please describe in detail how the Postal Service accounted for differences in TPF for various types of AFSM 100 operations and/or DBCS operations.

e. Please discuss whether variabilities for workhours if estimated for various types of AFSM 100 operations and/or DBCS operations would be different from the variabilities currently estimated for AFSM 100 and DBCS operations in Proposal Six. Please provide the results of any analysis that supports the conclusion.

f. Please discuss whether the Postal Service considered including any control variables in the workhours econometric equations for AFSM 100 and DBCS operations and, if so, explain why these variables were rejected. If applicable, please provide program, log, and output files that illustrate the approach pursued and the results received.

RESPONSE:

a. The AFSM 100 and DBCS operation groups defined in USPS-FY19-23 distinguish outgoing and incoming mail processing schemes. The AFSM 100 MODS operation groups also distinguish subtypes of AFSM 100 equipment representing AFSM 100 machines with Automated Induction (AI) and/or the Automated Tray Handling System (ATHS). MODS operations do not distinguish subtypes of DBCS equipment. As discussed in the Variability Report at 6**,** the AFSM 100 upgrades,

which were deployed in FY2006-07, may have the effect of improving productivity in peak or other high-volume circumstances while limiting downward flexibility of workhours under declining volumes.

The mail processing schemes differ in the postal geography to which the mail was sorted or presorted prior to induction, and to which pieces are sorted after processing. Outgoing Primary schemes sort originating unsorted pieces (and/or mixed ADC/AADC presort) to outbound destinations, such as ADCs/AADCs, other high-volume P&DC/Fs, and perhaps also high-volume destinations within plant's service territories. Outgoing Secondary schemes perform additional separations on mail previously processed in Outgoing Primary schemes where necessary. Incoming Primary, SCF, and MMP schemes sort pieces processed to 3-digit ZIP Codes (or 3-digit ZIP Code ranges) or ADCs/AADCs mainly to 5-digit ZIP Codes (or ranges; i.e., post offices or unique ZIP Codes). Incoming Secondary schemes process mail from 5-digit ZIP Codes (or ranges) to carrier routes, firm holdouts, and/or delivery point sequence.

b. Confirmed that the TPF variables used in the Proposal Six models aggregate TPF workload and workhours over the AFSM 100 and DBCS operation groups defined in USPS-FY19-23.

c. Several factors influenced the decision to align the Proposal Six variabilities with the existing labor cost pool structure in Cost Segment 3.1, which also does not distinguish subtypes of operations within the DBCS and AFSM 100 cost pools.

First and foremost, not all of the operation detail in MODS can practically be implemented for elasticity estimation, especially for AFSM 100 operations. The main limitation for AFSM 100 operations is that flat mail preparation operations (operations 035 and 140) only effectively distinguish AI from non-AI operations (not the four machine subtypes), and are not separable by scheme. Since flat preparation operations comprise a majority of workhours and costs, these limitations are material and as a practical matter, make it possible to estimate variability equations only for groups of AI and non-AI AFSM equipment. The Postal Service analyzed AI and non-AI AFSM operations separately and found that the elasticity differences were not statistically significant, though the point estimates lend some support to the Variability Report's observation that workhours (and hence costs) for AI equipment may be less flexible with respect to changes in workload. AI equipment accounts for 74 percent of workhours for the FY2016-2019 sample period. Results of the analysis are provided in the response to part (e), below.

Additionally, the long-term declines in single piece volumes have led to greater reductions in the scale of outgoing distribution relative to incoming distribution, such that workhours and labor costs are heavily concentrated in incoming operations, particularly incoming secondary processing. In FY2005 (the Docket No. R2006-1 Base Year), for which the Postal Service proposed separate outgoing and incoming DBCS

elasticities, outgoing operations accounted for approximately 20 percent of letter automation workhours. For the FY2016-2019 Proposal Six sample period, outgoing operations accrued 8.4 percent of DBCS workhours, with generally declining workhours over the period. Maintaining additional regression equations for small and diminishing operations, as well as calculations to weight results together to cost pool-level variabilities, was not viewed as justifiable, given the statistically insignificant differences between the disaggregated elasticities and the combined result. See the response to part (e), below, for results.

Disaggregation also raises a number of other potential practical issues. If cost pools and distribution keys also were to be disaggregated, the reliability of certain data may be adversely affected. Errors in workhour recording within cost pools or broader operation groups may not cancel to the same extent in a more disaggregated analysis, which may distort the calculation of accrued costs for disaggregated cost pools. Disaggregating distribution keys would result in relatively small shares of tallies being assigned to disaggregated cost pools in some cases. Given the shares of workhours in the operations, distribution keys for outgoing DBCS operations and non-AI AFSM operations would be expected to have less than 10 percent and 25 percent of the weighted tallies in the aggregated cost pools.

d. Not applicable.

e. The table below shows the results of alternative models separating DBCS operations between outgoing and incoming operations, and AFSM 100 operations between AI and non-AI operations (including flat preparation workhours for each). The programs and detailed output logs supporting the analysis are provided in new folder USPS-RM2020-13-3.

Workhour elasticities from disaggregated DBCS and AFSM 100 operations

Operation	Elasticity	Std Error	Hours (FY2016-19)	Hours Wt.
DBCS OUT	1.092	0.07	12,207,141	0.084
DBCS IN	0.956	0.039	132,858,416	0.916
Wtd. Avg	0.967	0.036		
DBCS Proposal Six	0.976	0.032		
Operation	Elasticity	Std Error	Hours (FY2016-19)	Hours Wt.
AFSM NON-AI	0.88	0.071	13,984,069	0.259
AFSM AI	0.78	0.102	39,919,902	0.741
Wtd. Avg	0.806	0.078		
AFSM Proposal Six	0.774	0.091		

f. The Postal Service's response to Chairman's Information Request No. 1, Question 2(c) describes additional variables the Postal Service considered. Additionally, the Postal Service notes that control variables such as indicators of the type or mix of equipment in place at a MODS facility, or indicators of whether the facility is designated as an ADC or AADC, would be subsumed in the models' facility-specific fixed effects. Thus, the omission of explicit facility-specific control variables would not imply that the models fail to control for such factors.

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6. In the Petition, the Postal Service states that the variabilities would be re-estimated annually "using the most recent four fiscal years' data." Petition, Proposal Six at 5. In the Response to CHIR No. 1, the Postal Service opines on the potential impacts of the COVID-19 pandemic on the Postal Service: "[I]t may be reasonable to expect an extended period of adjustment of workhours to letter and flat distribution workloads, similar to what was observed over the Great Recession." Response to CHIR No. 1, question 11.a.

a. Please discuss the anticipated time frame of the noted above "extended period of adjustment."

b. Please explain under what circumstances the Postal Service would reconsider its decision to use the 4-year sample period for estimating the variabilities.

RESPONSE:

a. The quoted statement does not have a specific time frame in mind, and at present there is insufficient information to speculate as to the longer-term effects of the COVID-19 pandemic on automated distribution operations. Rather, it acknowledges the possibility that the entirety of the operational response may take place over a longer period of time than the normal adjustment process of workhours to volumes or workloads.

b. As noted in the response to Chairman's Information Request No. 1, question 11(b), the Postal Service considers shorter (and longer) sample periods to be potentially justifiable in principle, subject to potential tradeoffs in sample size, stability of results, and/or the speed with which data affecting measured elasticities rolls into or out of the regression samples. However, the stability of results is not an end unto itself, to the extent that operational changes or factors such as the COVID-19-related volume changes actually have consequences for cost variability. A preferred econometric approach to addressing COVID-related

distribution workload impacts may not involve changing the sample period at all, but rather might involve introducing recession-related control variables or the like.

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7. Please *see* Attachment, filed under seal.

RESPONSE:

Please see the response filed under seal in the Preface to USPS-RM2020-13-NP2.

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8. Please *see* Attachment, filed under seal.

RESPONSE:

Please see the response filed under seal in the Preface to USPS-RM2020-13-NP2.